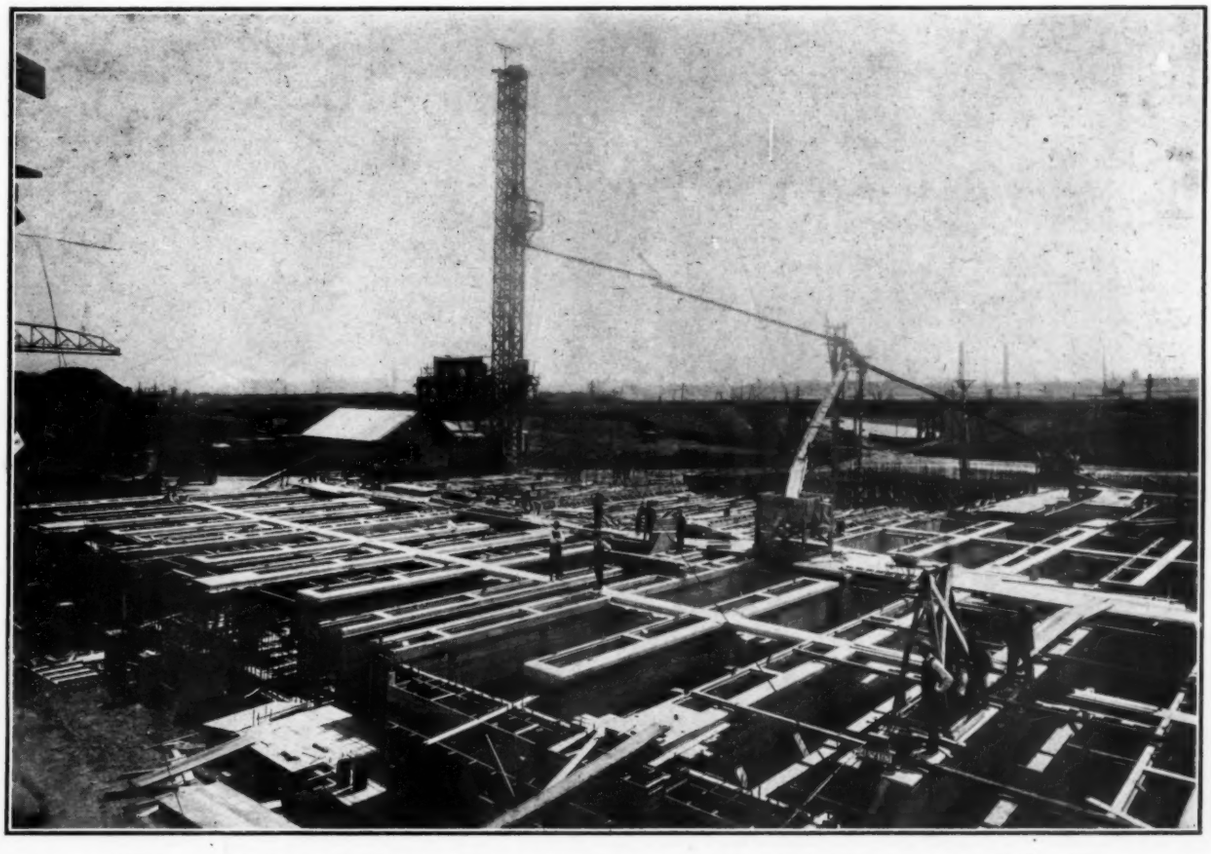
PUBLIC WORKS

CITY COUNTY STATE



GENERAL VIEW OF IMHOFF TANKS OF CLEVELAND'S NEW SEWAGE TREATMENT PLANT
Concrete mixer and tower in background. Chutes lead to hoppers, which discharge into wheelbarrows, by which concrete is deposited in the forms

IN THIS ISSUE

SEPTEMBER 3, 1921

KOEHRING

Look under the drum!

IF it is a Koehring mixer, you will see that the heavy drum is supported by drum rollers, constructed on freight car truck principle. The drum rollers do not turn on a fixed axle, which under the down thrust of heavy drums soon must wear flat on the top side and set up pounding vibrations throughout the mixer. No—the rollers which support the Koehring drums are fixed to shafts which turn in big bearings easily accessible on the main frame! There's a simple, accessible, easily lubricated, long-life construction, right there at a point of greatest strain and wear. But it is only one of the better construction features which make Koehring the ***Heavy*** Duty Mixer.

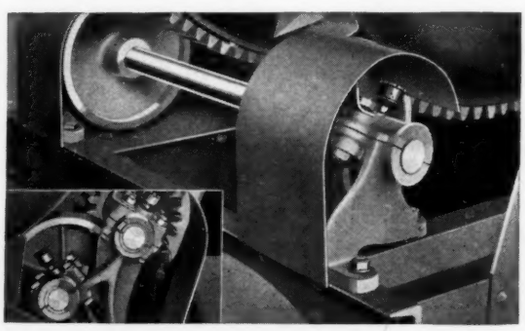
CAPACITIES

Pavers: 10, 14, 21, 28 cu. ft. mixed concrete, steam or gasoline, multiplane traction, loading derrick, power discharge chute.

Construction Mixer: 10, 14, 21, 28 cu. ft. mixed concrete, steam and gasoline, power charging skip, batch hopper.

Dandie Light Mixer: 4 and 7 cu. ft. mixed concrete, low charging platform, power charging skip, light duty hoist.

Write for Bulletin P. 14



The above shows the heavy brackets, mounted on the main frame on which are mounted the extra big bearings in which turn the drum roller shafts. Notice that the bearings are at an angle which brings the load on the full face of bearing. These bearings are extraordinarily long, and easily accessible for lubrication or re-babbitting.

KOEHRING COMPANY · MILWAUKEE WISCONSIN

PUBLIC WORKS.

CITY COUNTY STATE

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Vol. 51 SEPTEMBER 3, 1921 No. 10

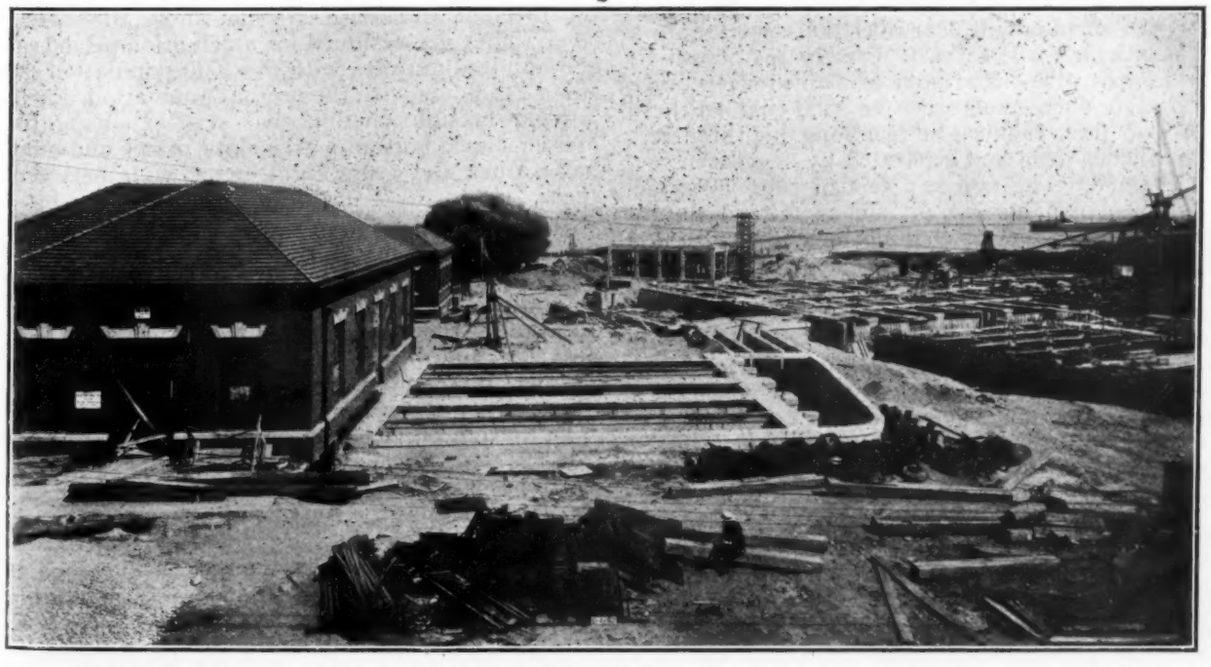
Cleveland Sewage Treatment Plan

This plant, now nearing completion, comprises novel grit chambers and thirty-two Imhoff tanks, and all effluent will be metered and chlorinated. The construction methods also include several novel features.

Cleveland discharges its sewage into Lake Erie, either directly or into the Cuyahoga river near its mouth into the lake. The new water works intake crib is located about five miles from shore opposite the western portion of the city. Most of the movement of the lake water is toward the east but in spite of this there is more or less danger of polluted water reaching the intake. In addition to this danger, there are parks and bathing beaches along the shore and because of these and other uses of the shore front a treatment of the sewage has long been recognized as being desirable. Experiments in sewage treatment were begun in 1913 and about $150,000 has been spent on them. Contracts for the two lake front disposal plants were made in 1919 and these plants will probably be ready for operation by the early part of 1922.

DESIGN OF TREATMENT PLANTS

For sewerage purposes, the city was divided into four districts known as the easterly, westerly, southerly and low level. The two plants now under contract serve the easterly and westerly districts. respectively. As it is expected to make radical changes in the Cuyahoga river, and as most of the sewage in the low level district, which lies along its banks, is trade waste, the resident population being small, the sewage from this and the relatively small southerly district will not be treated at the present time. Ultimately this sewage, which will be discharged into the river, will probably be treated more completely than is be-



CLEVELAND SEWAGE TREATMENT PLANT. SCREEN HOUSE AND GRIT CHAMBER IN FOREGROUND IMHOFF TANKS AT RIGHT BACKGROUND, CHLORINATING HOUSE IN CENTRE BACKGROUND.

ing provided for by the easterly and westerly treatment works which are located on the shore of the lake and discharge their effluents directly into it.

The populations used in designing the plants were 288,000 for the westerly plant, 575,000 for the easterly, and 226,000 for the southerly. The estimated sewage flow per capita is 125 gallons daily for the westerly district, 160 gallons in the easterly and 110 gallons in the southerly. This will give normal dry weather flows of 36,000,000 gallons a day, 92,000,000 gallons and 25,000,000 gallons, respectively. Provisions are made for wet-weather flows of 159,000,000 gallons in the westerly plant, about one billion gallons in the easterly and 131 million in the southerly.

The general features of both the easterly and westerly plants are practically the same, although the tank structures for the easterly plant are omitted for the present, and a description will be given of the westerly plant only.

Sewage is brought to this plant by an intercepting sewer with a maximum capacity of about 850 million gallons a day. The city is sewered on the combined plan, with many overflows of the weir type permitting the discharge of surplus storm water into ravines, the river or the lake.

The dry-weather sewage reaching the plant will enter it through a central channel in which are placed two bar screens set at an angle of forty-five degrees with the vertical, one of them having 1½-inch spacing between bars and the other three inches.

On each side of this channel are two others for carrying diluted sewage in times of storm. These other channels also are provided with bar screens and also with grit pits for intercepting the heavy suspended matter. The central or sewage channel has no grit pit and has on each side an overflow weir placed at such an elevation that when the flow exceeds a rate of 100 million gallons a day, the surplus will flow over these weirs into a bypass which will carry it directly to the outlet.

The grit pits differ from probably every other design for such structures. In each channel there are two pits, each eight feet long by three feet nine inches deep and separated by seventeen feet of channel. The nineteen feet of channel immediately above the first pit slopes toward the pit and the eight feet of channel beyond the second pit slopes up from it. It is believed that grit deposited along the channel will be carried by the current into the grit pit, being aided by the sloping floor, and that in the meantime it will be cleaned of any adhering organic matter. It is especially desired that the grit collected be clean enough to be inodorous, so that it can be used as fill without offense. It has been found from experiment that to meet this condition it must contain not more than 15 per cent of organic matter. It is probable that some of the finer mineral matter may be carried through the grit chamber and into the sedimentation tanks but provision is made for removing such deposits from the sludge hoppers, should they occur, by pumping.

Each channel is calculated to have a capacity of from twelve to twenty-four million gallons a day with velocities of one-half to one foot per second. The over-all length of each grit chamber is 50 feet. In order that the attendant may be facilitated in throwing into operation additional grit chamber channels when the amount of storm flow may make it desirable, these are controlled by large hydraulically operated sluice gates. Should it later be thought desirable, these can be arranged to be operated from a central switchboard.

From the grit chambers the sewage passes through sedimentation tanks of the two-story or Imhoff type. First, however, the sewage enters an equalizing chamber which is provided with partition walls for distributing the flow to the various batteries of tanks. For the present, stop planks will be used for regulating the flow. From the several distribution channels, the sewage will be distributed to the tanks, the channels being arranged so that flow in the tanks can be reversed at will. Just before entering the tanks, the sewage flows into a small entrance chamber where its velocity will be reduced. It leaves this chamber through a submerged orifice, this construction being expected to collect some of the grease and other floating materials in this chamber rather than permitting them to flow on into the sedimentation tanks. Adjustable weirs are placed in the inlet openings to each entrance chamber in order to accurately control and measure the amount of flow to each tank.

There will be thirty-two Imhoff tanks arranged in four rows of eight tanks each, the several rows being separated by three galleries. Between the first and second and between the third and fourth rows, the gallery will contain a sludge channel. In these galleries also will be located water piping, valve handles and other apparatus. The bottom of the flow channel serves as the roof of the pipe gallery. Each of the thirty-two tanks is 50 feet long and 25 feet wide, and contains two hoppers. The water will have a depth of 27 feet and the tank walls rise two feet above the water level. They are designed for a detention period of one hundred minutes with the 1930 population or about 2½ hours with the present population. Each flowing-through channel has a "V" shape or double-sloped bottom with a slope of one and one-half on one and a slot eight inches wide between them.

Each tank has a gas vent nearly its full length in the center of the tank. These vents are to be covered with hinged wooden doors in order to minimize the possibility of odors, because of the location of the plant adjacent to a park and well-traveled boulevard. Should there be an excessive amount of foaming, the scum can be drawn off through an opening in the end of each gas vent. The bottom of each hopper comes directly under the gas vent and eight-inch sludge pipes rise vertically from the hopper bottoms through the gas vents, providing for rodding the pipes in case of stoppage. Each discharges into a horizontal branch 7½ feet below the water level which is supported in the cross wall of the sedimentation tank and discharges into a main which leads to the sludge channel. Each sludge channel leads to a sludge well which has a storage capacity of about five hundred cubic feet and from which the

sludge will be pumped by a centrifugal pump or ejector.

In each sedimentation tank there is a cross wall for stiffening the tank and supporting the sloping bottoms of the upper sedimentation chamber, the gas vent walls and the sludge pipe. These cross walls do not extend to the bottom of the tank but are provided with an arch in their bottom edge, thus minimizing the separation of the bottom or sludge compartment of the tank. The sloping bottoms of the flowing-through compartment are built of hyrib metal supporting a three-inch slab of concrete applied by the cement gun.

Each gallery between the sets of Imhoff tanks will contain water mains from which pipes will be carried to each tank, feeding a pipe grid which will be placed around each hopper bottom to be used in flushing off the sludge; also a two-inch pipe will run to the bottom of the hopper for softening up the sludge in order to start the flow of sludge into the sludge pipe. Water pipes will also be carried to convenient points and furnished with hose connections by means of which water can be used for wetting down the scum, washing the plant and other purposes.

The tanks are designed with a scum capacity of 0.6 cubic feet for each person and a sludge capacity of 1.2 cubic feet. This is expected to provide sludge storage for 5.7 months ultimately or 8.5 months with the present population.

It is proposed at first to pump the sludge into barges which will carry it out northeast into the lake about three miles to a government dumping ground, where dredgings from the Cuyahoga river are deposited. If it becomes necessary to discontinue this disposal, provision is made for sand beds for receiving the sludge along the shore of the lake.

Leaving the Imhoff tanks, the effluent will pass through a Venturi meter and then through a chlorinating well where chlorine is to be applied at the rate of ten parts per million. Connected with the Venturi meter will be appliances for controlling the quantity of disinfectant applied, which application will probably be by means of standard chlorine machines of the solution feed type. These chlorine pipes together with pipes for steam heating, water, etc., will be carried in a pipe gallery laid under the ground surface and connecting the house which contains the Venturi meter and chlorinating apparatus to the building at the entrance of the plant where a steam boiler for heating purposes and an incinerator for burning screenings will be located, the screenings being first passed through a press of the cider mill type for removing superfluous water.

The effluent, after being disinfected, will pass through an outfall with multiple outlets, which was described in our issue of February 26, 1921, and which has for some time been carrying the sewage of this district.

CONSTRUCTION

In constructing this plant, the area was first enclosed by steel sheet piling about 250 feet on each side. This was driven down about 18 feet, the bottom being several feet in soft blue clay. Owing to the tightness of the sheeting and the clay bottom, very little water enters the enclosed area, two 2-inch centrifugal pumps electrically operated being more than capable of handling the seepage. The sheet piling is not braced from the inside but heavy wooden piles are placed just inside of it at intervals and these piles tied back by long steel rods to anchor piles driven solidly into the ground outside of the enclosure.

The bottoms of the sedimentation tanks were excavated 15 to 18 feet deep and were in the blue clay referred to. This gave a solid support and no piling was used. It was found, however, that the clay was very slippery and sticky and made it difficult for the workmen to surface it to the desired lines and to maintain it there while placing the concrete bottoms of the hoppers, at least without working more or less of the clay into the concrete. For this reason, after shaping the clay bottom, a 3-inch concrete bottom was laid and allowed to set. This concrete floor provided a dry and clean platform on which to work and to place the concrete hopper bottoms and the contractor found that the cost of this concrete working floor was less than that incurred by having the men working in the clay; in addition to which this construction made it possible to secure absolutely clean concrete. The concrete hoppers were all built in forms rather than being surfaced by hand, this also not only giving better results, but being considered by the contractor to be the more economical method. All of the tank bottoms have been completed and are apparently perfectly water-tight.

The concrete for the bottoms and heavier side walls was placed by means of tower and chutes, Lakewood mixers, tower and chutes being employed. The minimum grade of chute used is about three horizontal to one vertical and although the concrete is mixed as wet as is frequently found necessary for the chuting, it is very seldom necessary for men to assist the flow of the concrete in the chute by hand. In pouring the concrete for the thinner walls in the tops of the tanks it is thought by the contractor to be more economical to use concrete wheelbarrows, which are filled by chutes reaching various parts of the plant and carried to the exact point of application on running planks. The continual changing of the position of the end of a chute when pouring a thin wall is believed to be more costly in delays and hours of labor than the method in use.

The concrete throughout seems to be unusually sound and of good surface. Some of the older concrete which was completed almost a year ago is standing with no appearance of deterioration, such as checking or surface disintegration. Exposed surfaces are covered with wet bags or other materials for at least a day or two after pouring, the length of time depending upon the weather. On removing forms, the green concrete surfaces are rubbed down with a wet brush and a smooth surface is thus obtained on all exposed concrete.

All concrete is made abundantly thick for safety. Reinforcement is used practically everywhere. Where the strength does not theoretically require it, reinforcement is used to prevent temperature or other cracks or on general principles.

An abundance of valves are used on all pipe lines and of stop planks in open channels, on the general principle that the construction of the slots for such planks costs practically nothing during construction but would be expensive to cut out should they be needed at any time later.

The construction of this plant is in immediate charge of J. M. Heffelfinger, senior assistant sanitary engineer of the Department of Public Service. The work is being done under the Department of Public Service, of which Robert Hoffman is chief engineer. The design and construction are under the supervision of George B. Garcoigne, sanitary engineer in charge of the Subdivision of Sewage Disposal.

The contract for the western disposal plant was let to Masters & Mullen Company, of Cleveland. The estimated cost is $1,000,000.

The Berlin Turnpike

Eight miles of macadam road in Connecticut reconstructed with 22-foot concrete roadway for $490,000 on cost plus 10 per cent basis.

Occasionally when the Connecticut State Highway Department is unable to predetermine all of the conditions and requirements for a road construction job, especially when traffic must be maintained and it is difficult to foresee what regulation will be best for it, and when the state wishes to maintain control of the details, to make changes as the situation develops and to modify the original plans, it frequently executes the work on the cost plus percentage basis.

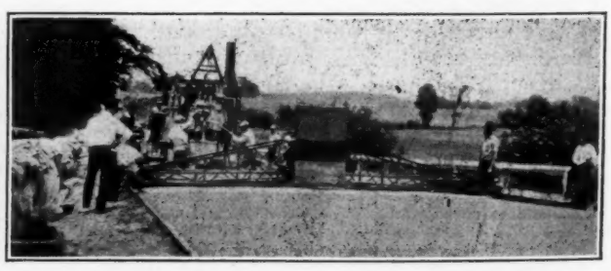
In cases where it is not practicable to prepare a satisfactory specification in advance that will cover all of the conditions, it is customary to make a contract for the performance of the work, by which the contractor will furnish plant, equipment and supervision and will hire the labor, and the state will pay all bills for labor and material and other necessities outside of machinery, equipment and supervision and will in addition pay the contractor 10 per cent of the total amount of the state's preliminary estimate of the construction cost as his profit for superintendence and use of equipment.

This affords the state opportunity to develop the plans as the work progresses and in accordance with changing conditions; enables it to increase or decrease various amounts and to take complete control of the details and operations without injustice to the contractor and without incurring costs for damages or increased charges for extras. At the same time it is able to make any economies that the conditions warrant or to make extensions on the basis of the actual cost incurred, so that by strict supervision and accurate bookkeeping, an opportunity is afforded for modifications that are advantageous to the state and still insure a predetermined compensation to the contractor without subjecting him either to danger or loss through conditions beyond his control or affording him an opportunity to make excessive profits.

This arrangement assumes that the contractor has abundance of suitable equipment and is vigorous, efficient and trustworthy in his execution of the work, which should, in addition, be minutely and continually supervised by the state engineer and auditor. In this way the state practically insures itself against unforeseen conditions, reaps the corresponding reward for unexpected advantages and wholly eliminates the gambling principle found in the fixed sum or unit price contract arrangement.

The Berlin turnpike, a 22-foot concrete road about 8 miles long, was built for the State Highway Department by the Edw. Balf Co., of Hartford, and the Lane Construction Corporation, of Meriden, on the cost of plus 10 per cent basis for about $490,000. The 10 per cent fee was computed on the cost estimated by the Highway Department and accepted by the contractors. When the road was completed it was found that the actual cost of the construction, exclusive of the contractors' fee, was about 10 per cent more than the department's preliminary estimate, due large-

TRAP ROCK STORAGE PILES



FINISHING SURFACE OF CONCRETE BY MACHINE

ly to delays in securing materials, especially cement as required during the progress of the work and to some extent to labor shortage and inefficiency.

Conditions were favorable to the execution of the work in that it was practicable to divert all traffic to a parallel road so that construction operations could be carried on without interference along the entire length of the route. The job was the reconstruction of a macadam road that had been built about 12 years previously and consequently needed little additional grading.

METHOD OF CONSTRUCTION

In general, the old macadam was first scarified by an attachment operated on the rear of the steam roller and the broken stone was distributed with scrapers and compacted by steam rollers to make the foundation for the concrete surface.

The work was divided into four sections, executed by as many different parties, two of which commenced at the center and worked toward the ends where the other two commenced, meeting and completing the work at the quarter points of the entire length. Nearly all of the foundation work was done with the steam rollers and scrapers, no team work being required except for long hauls on fills. About $75,000 was expended in extensions and improvements of the original drainage system.

The sand, which was hauled 13 miles, and the broken stone and cement were all delivered by trucks and the aggregate stored in piles during the winter previous to the execution of the work, and when the latter was commenced, loading machines at the piles served the trucks by which the materials were distributed along the location just ahead of the concrete mixer, trucks being used for this purpose because the grades were too steep for the installation of an industrial track.

The contractor installed a 2-inch main the full length of the roadway and through it delivered water from various successive sources of supply to the mixing machine and for other purposes required. The concrete surface, 22 feet wide, was laid at a record speed of 800 feet per day and toward the close of the work the progress averaged about 1 mile per week.

PLACING AND FINISHING CONCRETE

Contra Costa County's "Safety" Highway

The county engineer of Contra Costa county, California, R. R. Arnold, in 1919 laid an experimental quarter-mile section of a two-track highway that has proved so successful that the county has built twenty miles of similar construction on the highway between Martinez and San Ramon, and has completed altogether about 35 miles, with 7 more under construction.

This type, which has been called the "safety highway," is constructed of two strips of concrete pavement each 8 feet wide, separated by a 4-foot strip of oil-bound macadam, and with a 2-foot shoulder of the same material on each side. The central strip is raised 1½ inches above the level of the concrete pavement, which encourages the traffic to keep on its own side of the road, although the central strip can be used for passing a vehicle going in the same direction. This tends to prevent collisions. The black central strip affords such contrast with the light concrete that they can be distinguished at any time.

The slabs are made five inches thick, which is believed to be sufficient for such a narrow roadway, thus saving in cost. The longitudinal cracks that appear in wide concrete pavements are avoided, and no reinforcement is necessary. Mr. Arnold's figures show that the double slab type of road with shoulders costs $2,000 per mile more than an 18-foot pavement 5 inches thick without shoulders, and $700 less than such pavement with 2-foot shoulders.

An additional advantage is that traffic can use one side of the road without interruption while the other side is being constructed.

LOOKING BACKWARD FROM MIXER TO ROAD IN THE BACKGROUND PROTECTED BY COVERS

Important Wage Reduction

The United States Steel Corporation has officially announced that on August 29 the wages of mill laborers in general will be reduced to $.30 an hour and that other wages and salaries will be equitably adjusted. Following the 20 per cent reduction of May 16 by the same corporation this effects a total reduction of about 34.8 per cent from the post-war peak rate of $.46 an hour in effect previous to last May, besides which the wartime arrangement of time-and-one-half pay for overwork was eliminated on July 16.

The decision of the United States Railroad Labor Board abolished the time-and-one-half rate to men assigned to necessary Sunday and holiday employment when the work requires continual performance seven days a week, and the men are regularly bulletined for it. This is the first rule prescribed by the labor board to replace the national agreements established during federal control, and applies only to the 137 railways involved in the overtime controversy with the six federated shop crafts, but will bind all other roads as soon as their cases come before the board. Railroads having independent agreements with their employees will, however, be exempted from the rule.

In explanation the board announces that "the soundness of the principle of punitive pay for overtime work has been recognized, but not to the extreme extent embodied in the national agreement. The 8-hour day has also been given full recognition. . . . If men are called after regular hours for some emergency work it is fair and reasonable to use these men only on other emergencies, which may have developed since they were called, without being obliged to call them again or to call other men. . . . It is just and reasonable that men assigned to road service on a monthly basis should be paid on an 8-hour day, 365 days per year, without any allowance for overtime."

The statement accompanying the rules calls attention to the fact that the wide diversity of rules among the numerous railroads of this country before federal control, makes it possible to cite precedent for almost any rule that may be advocated and that such precedents are at best only persuasive, should not control, therefore the board has not considered the principle of right and wrong involved in the proposals and counter proposals submitted to them in the light of present conditions and industrial history. The action of the board was opposed in a minority report by the former president of the American Federation of Labor, who is one of the three labor representatives on the board. He objected to the decisions against "conditions that have been in effect from ten to twenty years," and, among other objections specified that under the new rules employees called for work and not working, or working 2 hours and 40 minutes or less, will receive four hours' overtime instead of five; and that instead of 5 hours pay the employees called one hour or less before their regular time will receive time and one-half for the overtime.

Town Planning

Town planning and its relation to the improvement of the capitol of the Diminion of Canada were discussed at length in a somewhat poetical and academic address urging the creation of a federal district to include the cities of Ottawa and Hull, that was made before the special Senate Committee by Noulan Couchon, chairman Ottawa town planning commission, whose remarks tended to the ethical and sociological aspects of town planning in general, and included some practical definitions of important principles.

He said, in part:

. . . The ethical raison d'etre, the justification of town planning, lies in the injunction to society, collectively no less than individually, to fulfil the Golden Rule. The injunction to "Do unto others as you would that they should do to you" imposes the abolition of the slum, be it of overcrowding in the city or of isolation in the country.

The crux of the problem in the complex of modern civilization is to determine the use and development of land and to obviate congestion, which is primarily a matter of so adjusting inter-communication, waterways, railways, highways and social intercourse as to afford freedom in exchange of the products of the energy and mind of man.

Town planning in theory and in practice is the technique of sociology, it is the professional application of knowledge for social betterment.

Planning aims, through rapid communications, good roads, small holdings, coupled with the stimulating amenities of community life, to endow rural production with the power of attracting the tide of popular aspiration, of desire, from the city to the field, as the antithesis of hardship, isolation and the social disabilities of pioneering.

. . . The ethics of town planning enable a prophetic vision of the standards that must obtain for the race in ultimate resistance against the alien tide that may deny it supremacy—existence.

These standards must be sustained by work and play, by thought and the joy of living. Further, these standards must be guarded by a scientific sifting at our gates of the eager inflow of indiscriminate immigration. Elemental to survival is the exclusion of those who would underlive us to extinction.

. . . The proposal consists in vesting control of the physical features and public services of Ottawa and Hull and the surroundings of both, in the hands of a Federal District Commission, whilst leaving undisturbed the present political status—dominion, provincial, and municipal—in all that otherwise pertains to autonomy in civil and in criminal law.

Assessments, taxes and the distribution of these might remain provincially divided as at present, but be supplemented proportionately by the Dominion government in respect of those rates ceded to the commission by the municipalities.

As an instance, this advisedly, technical commission would do the planning and engineering work for both cities, spending their quota of taxes for such purposes in the respective provincial areas from which they were collected.

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CONTENTS

Progress in Wage Adjustment

The facts that more than 5,000,000 workers in the United States are now reported as being idle (because they or their fellows refuse to accept abundant work at reduced but still too high prices); that the last published official comparative data show that in the United States the wages of bricklayers were 6.8 times as great as in France with the ratios of carpenters, painters and plasterers not very much less, while common laborers received more than 5.7 times as much as in France; that the English bricklayers received only about 30 per cent of American wages, other mechanics a slightly greater proportion and laborers 52 per cent, while in all the other principal countries noted, all kinds of workers receive much less (in Germany and Austria the highest price quoted for mechanics of any kind was $.99 and for laborers $.53), all figures being based on the exchange value of American money; that production in this country is greatly retarded and vital improvements delayed by the high price and inefficiency of labor; that the reports are unanimous of increasing industry and efficiency abroad, particularly in Germany and France, where the work is intensive and a working time of 10 hours or even more per day is producing astonishing results; and that the costs of materials and supplies in this country have decreased much more than labor, and stocks of many raw and manufactured materials are running low—these fundamental facts are of the gravest national importance.

Under such conditions there can be no question of the necessity of adjusting wages promptly to a proper co-ordination with both comparative and intrinsic values, and to a competitive scale with the rest of the world.

Much encouragement is afforded by the action of the eastern, western and middle groups of railroads in refusing to cancel their recent necessary cut in wages at the insolent demand of the unions accompanied by a scarcely veiled threat of a country-wide strike and the wholly unreliable promise to refrain from additional demands in the near future, and by the strong attitude of the southwestern railroads that refused even to discuss the subject with them.

The statements on other pages of this issue, to the effect that the United States Labor Board has reduced some of the unwarranted over-payments to the railroad employees, and that the United States Steel Corporation has made an important horizontal cut are equally important and gratifying. The railroads and the steel manufacturers represent industrial and labor interests of far greater magnitude than any other single elements in this country, and their action cannot be over-estimated. Both of them have the merits of absolute fairness coupled with generosity, and it should be especially noted that very material privileges and advantages are still afforded to the railway employees above those in any other great organization, and that the steel makers have more than demonstrated their good faith by announcing heavy cuts in the prices of their finished products several weeks in advance of the wage decrease, and are showing every consideration for the workers.

It only remains for the workers to accept those conditions in a manly, progressive spirit and they can readily by concerted action, classification and increased industry secure so much greater efficiency that their remuneration will become greater than even under the inflated war wages, while the purchasing value is greatly increased by the lower costs of living thus made possible.

Settlement of Structures

Most engineering structures, unless supported on rock, hardpan or rigidly confined, dry, hard, loose material, like gravel or sand, are subject to more or less settlement, which may or may not be highly undesirable, but which certainly is increasingly dangerous and troublesome as it becomes uncertain and irregular. Many structures like bridge piers, abutments, retaining walls, roads, railroads, canal locks, dams and even the foundations for buildings and machinery may settle considerably without serious damage or inconvenience provided they settle uniformly and the settlement is anticipated in the design and construction, but the settlement is likely to be troublesome and sometimes exceedingly dangerous and costly if it is unexpected, irregular or shows very abrupt changes in amount or rapidity.

The settlement is due to many factors, principal among which are the character of the soil, the amount of water in the ground, the intensity of the static load, change of load, impact, vibrations, disturbance of adjacent soil and other local conditions.

Under some conditions a moderate amount of settlement may be of very little import. Under many more conditions it will be found not to be very serious if it is regular and especially if it is anticipated and provided for in the design and construction. In other cases it must be reduced to a minimum and great care taken to diminish or control it.

Settlement is usually greatest on very wet, muddy or compressible soils, or those that are not homogeneous and may vary from a fraction of an inch to several feet. It may be immediate, slow, rapid or delayed, limited or progressive. On the determination of as many as possible of the factors and their proper consideration depend the excellence of the design and the economy and durability of the structure. Much, and sometimes all, of these data may be obtained by a careful study of locality and investigation of neighboring structures, by subsoil explorations with borings and soundings, by actual loading tests of the soil, and by careful study and analysis of all the information collected.

Only meager data is available in text books and other ordinary references and there is at present an almost total lack of uniformity or standard classification or rules of practice.

As unsatisfactory foundations may and sometimes do, cause damage far beyond the original cost of the construction, good practice is of immense importance, and recognizing this fact, the American Society of Civil Engineers has appointed a special committee of experts to secure and arrange available data on this subject. The committee has commenced its labors by issuing a comprehensive questionnaire which has been mailed to the large membership of the society, asking simple specific questions, the answers to which will eventually be of great value. Every engineer or builder will do well to apply for a copy of the questionnaire printed on a standard size blank from which blueprints can be made, and record thereon all of the data that his own records apply. If it is sufficiently complete and accurate it would probably be welcomed by the committee, although the questionnaire is not addressed to strangers. In any event, the recording of such data whenever and wherever observed, will not fail to be of great value to every engineer, builder and contractor and the questionnaire will serve as an excellent guide for selection, classification and recording.

Building Up Secure Construction Conditions

In the present unsettled times, when all industrial and constructional interests are finding a new working level, the correction of recognized faults in all ordinary procedure and the improvements of many unsatisfactory conditions will contribute greatly to the stabilization of construction and to the amount of it that can be executed for all kinds of federal, municipal and other sorts of public works. Sound propaganda to effect this is embodied in the working program announced by the Associated General Contractors of America, excerpts from which are printed on another page.

Among the most important items are the establishment of national conference and arbitration boards; adoption of standards for accounting, contracts and classified costs; securing open sale of material on the market and fall lettings of public works; promoting legislation to secure a Federal Department of Public Works; a selective immigration law; adequate federal aid for highways; proper railroad regulation and an effective water power development act.

These objects are normal and worthy and most of them are urgent and should be universally supported by individuals and organizations directly and indirectly interested in public works.

Desideratums of Engineering Construction

Excerpts from the program of the Associated General Contractors of America.

Maintain the National Board for Jurisdictional Awards in the Building Industry.

Organize a National Conference Board for the Building Industry, representing contractors, workmen, architects, engineers, and owners to consider working conditions, establish national standards, remove restrictions, eliminate strikes.

Promote the organization of official and voluntary Boards for Arbitration of disputes.

Secure payment for estimating and quantity survey. Formulate standard estimating forms for builders and highway contractors.

Develop a system of money accounting for contractors.

Standardize construction cost accounting practices, such as equipment rental schedules.

Secure necessary amendments to existing Standard contract forms and formulate others.

Revise, systematize and standardize compensation insurance classification and rates.

Secure passage of national legislation, as follows: Navy, war, treasury contractors' relief bills, Department of Public Works bill, a scientific selective immigration law, adequate Federal Aid for highways, an effective water-power development act.

Proper railroad regulation, including: (a) Maintenance of private ownership, (b) curtailment of Interstate Commerce Commission's arbitrary power to grant priorities, (c) modification of war-time freight rates on construction materials, (d) adequate support of railroad expansion.

Standardization of government contracts.

Secure an open wholesale market in materials.

Urge fall lettings of highway and public works contracts.

Seek the standardization of building codes.

Bearing Value of Soils

Standard classification of sizes and character of soils and details of loading tests issued in questionnaire of committee of Am. Soc. C. E. to secure data for study and formulation of accepted practice.

The special committee appointed by the American Society of Civil Engineers to report on the bearing value of soils is composed of Robert A. Cummings, chairman, 221 Fourth avenue, Pittsburgh, Pa.; Walter J. Douglas, secretary, 84 Pine street, New York City; E. G. Haines, Allen Hazen, James C. Meem.

It has issued a circular letter to the members of the American Society of Civil Engineers which says, in part, that "the allowable load is, in most cases, determined by the question of settlement and the effect of such settlement on the proposed structure. It is obvious that for certain types of structures the settlement should be kept to an

QUESTIONNAIRE AND BLANK FORM FOR RECORDING DATA OF SOIL LOADING TESTS ISSUED BY SPECIAL COMMITTEE OF THE AMERICAN SOCIETY OF ENGINEERS

Record of test for settlement ....., or observation of actual settlement of structure .....

Contributed by ..... Address .....

Date of test or observation ..... Location.....

Type of structure proposed or built .....

CHARACTER OF SOIL.

Committee's size grades, in millimeters. Give percentage of each if possible, if not, check prevailing size.					Common Class Index.*	Moisture.
Stones:	Coarse,	256.0	to	128.0	1....	Very dry
	Medium,	128.0	to	64.0	2....	Moist
	Fine,	64.0	to	32.0	3....	Wet
Pebbles:	Coarse,	32.0	to	16.0	4....	Saturated (below ground, water level)
	Medium,	16.0	to	8.0	5....	
	Fine,	8.0	to	4.0	6....	
Grit:	Coarse,	4.0	to	2.0	7....	Was the condition constant
	Medium,	2.0	to	1.0	8....	
	Fine,	1.0	to	0.5	9....	
Dust:	Coarse,	0.5	to	0.25	10....	or variable?
	Medium,	0.25	to	0.125	11†...	
	Fine	0.125	to	0.0625		
Flour:	Coarse,	0.0625	to	0.0312		
	Medium,	0.0312	to	0.0156		
	Fine,	0.0156	to	0.0078		
Powder:	Coarse,	0.0078	to	0.0039		
	Medium,	0.0039	to	0.0019		
	Fine,	0.0019	to	0.0000		

BEARING SURFACE

Position	Type	Loading
Depth below original surface in ft..	Test area	Constant .....
Depth below adjacent surface in ft..	Isolated pier.....	
Was it near any stream or other body of water?....	Section of well...	Variable .....
If so, how near?..	Pile footing.....	
How far above water below	Single pile	Subject to impact .....
Notes:	Open pit	
.....	Sheathed pit.....	
.....	Deep caisson.....	Maximum total load .....lb.
.....	Area of bearing surface, sq. ft.....	
.....	Was surrounding soil restrained, as by buildings?.....	Load per square foot .....
.....	Was friction a factor to be considered?	Notes:
.....	To what extent?...	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

Record of Tests or Observations of Settlement of Structures

Load per sq. ft., in pounds.....	500	1,000	2,000	4,000	8,000	10,000	15,000	20,000	25,000
Settlement, in inches									
Total time interval									

* Class 1, Soft rock; 2, shale; 3, hardpan; 4, gravel; 5, sand and gravel; 6, coarse sand; 7, medium sand; 8, fine sand; 9, fine sand and clay; 10, clay.

† Class 11, Special or unlisted mixtures, check, and describe here: .....

NOTE: For tests, record total settlement and total time at each increase of load; for settlement of structure record total time and settlement only, unless still progressing. Use a separate sheet for each record. Record any other useful information on separate sheets and attach. Mail all records of tests or settlement to E. G. Haines, 49 Lafayette street, New York City.

absolute minimum, because such settlement, or at least unequal settlements in different parts of the structure, will cause physical damage. For example: if a highly ornamental cut-stone building settled unequally in different parts, it might be much disfigured and injured by reason of spalling or cracking. On the other hand, an elevated railway carried by independent piers may settle considerably at one or more of the bearings with no evidence thereof whatever, except as indicated by the grade of the track. Structures on pile foundations, particularly around harbor and river work, almost invariably settle, but usually they are of a type and designed so that a reasonable amount of settlement is not injurious.

"It is believed that the limit of allowable load should be based on some definite portion of that part of the compression diagram showing a practically uniform rate of compression with increase of load. The amount of such percentage should vary with the type and importance of the structure."

The committee feels that the question of actual settlement is one of the principal determining factors in the question of safe bearing values. To enable the committee to make recommendations as to the limiting amounts of such settlement for different types of structures and soils, it desires to obtain as many records as possible of actual settlement of soils subjected to loads, both in the case of tests made for bearing value and those of actual structures which have settled after completion, together with such descriptive matter relative to the soil, and other conditions, as will enable the committee properly to classify the different records. The accompanying form of questionnaire has therefore been prepared, and it is hoped that the membership will co-operate by supplying as many records of settlement as possible.

Testing the Bearing Value of Soil

The bearing value of soils may be considered as the permanent load per square foot, which it will sustain without material settlement after a period of a few months from the time of its initial application. It should be assumed for a static load under the most favorable conditions that are to be apprehended and may vary from a very few hundred to 10,000 or even 20,000 pounds. Whatever it is should be predetermined when the structure is designed, thus permitting in some cases the bearing value to be increased and in other cases the design to be modified if necessary so as to decrease the unit pressure or to supplement the bearing value by utilization of frictional resistance as in the case of a cylinder, pile or caisson foundation.

The bearing value may be tested by observations on the foundations of existing structures, by special loading, and by driving piles, by which it is possible to determine with considerable accuracy the capacity of the soil to sustain loads and thus calculate for the settlement which will occur under future loading. It is thus often permissible to build important structures on very yielding soil, as for example in Chicago, where many tall and heavy buildings have been designed to provide in advance of the settlement of a number of inches and the final settlement after the structure was completed and its full weight and that of its contents was imposed on the soil, agreed within a fraction of an inch with the original calculations.

A remarkable example of such calculations is afforded by the foundations of the very tall and heavy municipal building in New York, which is supported on more than 100 pneumatic caissons, of which more than one-half were carried down to solid rock while the remainder rest on a stratum of quicksand. The quicksand was carefully tested in advance and it was calculated would sustain a certain load with a certain amount of settlement, which was allowed for in designing the steel work and superstructure, which is now supported partly on rock and partly on sand without any material variation from the intended elevation and without any injury to the lofty superstructure.

In this case and in many others very accurate and reliable work is necessary on account of the delicacy of the structure or the necessity of preserving perfect alignment of mechanical installations, making it necessary that the settlement, if any, shall be made absolutely regular. In other cases it is immaterial as in a pile trestle or viaduct where any reasonable amount of settlement can be easily taken up by grading the roadbed above and is much more economical than providing a perfectly stable foundation. This is especially true for temporary work, such as falsework piling where the piles frequently settle several inches or even feet so that the diagonal bracing as well as the blocking on top has to be continually inspected and revised.

The settlement of existing structures is easily determined by making on them permanent reference marks and referring them periodically to permanent bench marks by which a record of settlement and progress is easily prepared.

Crude tests affording indications, sometimes merely negative, can be had by driving rods, stakes and piles. The latter should always precede the final determination of the number of piles for a foundation in a location that is at all uncertain. Careful bearing tests are ordinarily made in an excavation of convenient depth, or to the bottom of the general excavation required, where a horizontal, undisturbed surface is prepared to form a unit loading surface, preferably not less than 12 inches square, to which a measured load is applied. This is often done by bracing a vertical 12 x 12-inch timber of convenient length so as to prevent horizontal motion and not resist vertical motion. The top of this column supports the center of gravity of a symmetrical loading platform from 3 to 10 feet square on which a measured quantity of sand, gravel, brick, paving stone, pig iron or other regular heavy ballast may be applied without shock, continuously or intermittently. Indexes attached to each corner of the platform should at the beginning of operations register at zero on scales carefully fixed on the ground.

The load should be applied so as to form successive increments of 50 or 100 pounds per square foot of tested surface, and the positions of the indexes should be carefully recorded after the application of each load. An interval of seven hours or days may elapse before a second reading is made and another increment added, and so on, until the settlement becomes too rapid, and the load should be allowed to remain undisturbed for several days or weeks, when it is likely to settle with diminishing speed until it eventually comes to rest or shows very slight additional change. The maximum load which can be carried without rapid change may be considered as the practical ultimate bearing load of the soil, and it generally causes moderate brief settlement which should not be increased and it is generally roughly proportional to the amount of load.

The bearing value of the soil for a large pier is sometimes considered a direct multiple of that indicated by a one-foot square test, but the assumption is not necessarily jutified.

Handling 90-Ton Sections of Emergency Canal Dam

Steel 6½ x 8-foot girders up to 84¼ feet long unloaded from flat cars, rolled 90 degrees in steel rope slings, swung to position and deposited in storage.

Extraordinarily large and heavy box girders have recently been unloaded from the cars, shifted and conveyed to storage in the field in a rapid and convenient manner by the utilization of the permanent plant installed for the operation of the Inner Harbor Navigation Canal, New Orleans, without the necessity of using derricks, locomotive cranes, skids, jacks or other appliances that would usually be required for work of this nature. Although the method is not one that would ordinarily be applicable to heavy girders handled in general construction operations, the simple and effective use of the powerful apparatus at hand and some of the details of the operation are worthy items of engineering practice that are entitled to recognition and may afford valuable suggestions for other cases.

UNLOADING 90-TON BOX GIRDER FROM FLAT CARS AT CANAL

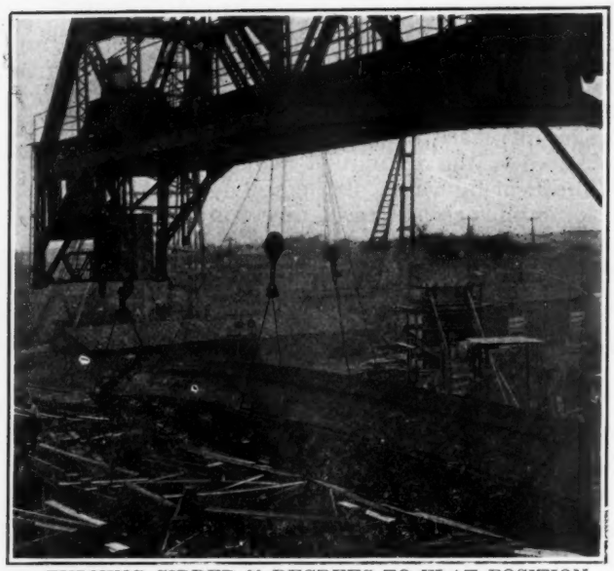
The Inner Harbor Navigation Canal of the port of New Orleans, for which Geo. W. Goethals & Co. were consulting engineers, has at each end lock gates that, in view of the history of other canals, may, it is assumed, sometime become crippled, making it necessary to provide for controlling the water in the canal under such conditions. This is accomplished by an emergency dam that is to be put in place when necessary a few feet above the gate where the canal is 75 feet wide and the maximum depth of water is nearly 50 feet, with a velocity of 10 or 15 miles per hour.

SECTIONAL STEEL DAM

One dam, which can be used at either end of the canal, is provided and consists of 6 heavy sections and 2 light sections, each section being a hollow box girder, 6½ feet high, vertically, and about 8 feet deep, horizontally, at the center point. One of the vertical faces is straight and the other is curved, and the heaviest girder weighs about 90 tons, exclusive of the ballast weight. All of the girders have a uniform length of 84¼ feet and are designed so that, if necessary, they can be floated from storage to the opposite end of the canal and yet so that their weight will be sufficient to sink them in the vertical wall guides to form successive horizontal courses of which the completed dam is composed. The girders, which were designed by Henry Goldmark, consulting engineer, of New York, were fabricated by the McClintic, Marshall Company, and shipped to the site, loaded on two flat cars each. At the site they were unloaded and placed in storage by a revoving steel crane of special design that has been installed on a fixed base to serve as a part of the permanent equipment of the canal.

UNLOADING WITH REVOLVING CRANE

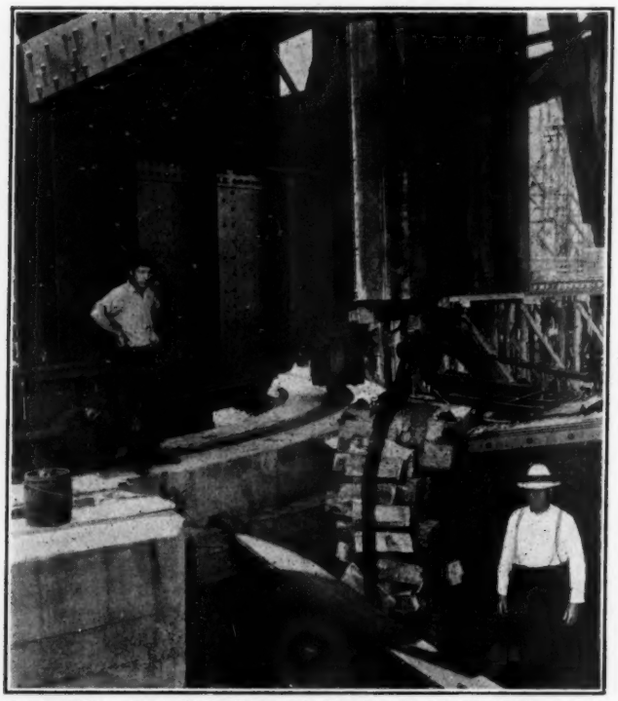
The crane has a trussed, double cantilever framework, somewhat similar to a swing bridge with one arm 104 feet long and the other arm 52 feet 5 inches long. It revolves through 360 degrees horizontally, enabling the long arm to reach across the full width of the canal, place the sections of the dam in position or remove them and put them in storage on skids with pile foundations in a semi-circular area prepared to receive them on the soft alluvial earth of the canal bank.



TURNING GIRDER 90 DEGREES TO FLAT POSITION, IN SLINGS

The crane is provided with powerful hoisting apparatus, mounted in the long and short arms, and the short arm is heavily counterweighted.

The girders were each delivered on flat cars with their vertical webs loaded in horizontal planes in order to secure necessary clearance. Short wooden blocks were packed around the webs and flanges of the girders and the ends to form cushions receiving several parts of steel wire rope that were seized together to form slings attached to the permanent overhead hoisting apparatus installed in the long arm of the revolving crane. Wire rope bridles were also attached to opposite sides of the girder at the center of gravity, connected to tackles suspended from the overhead revolving crane and operated by its hoists. The girder was lifted clear of the cars, with the convex face upward, swung to clear the masonry and then revolved 90 degrees, bringing the convex face vertical.



LASHING AND CUSHION BLOCKS AT EACH END OF GIRDER FOR LIFTING FROM CAR

REVOLVING GIRDERS IN SLINGS

The girder was lowered to a convenient temporary support on falsework, the lifting slings at the ends were released and removed, the cushion blocks removed and the multiple part slings replaced by new slings made with a single loop of heavy steel wire cable pulled through snatch blocks attached to the lifting device in the overhead revolving truss. The girder was hoisted clear of its support, and the end hoist locked in position, while the tackles attached to the ends of the center sling were operated, one being hauled up and the other slacked off, causing the girder to slowly revolve in the end slings, the latter remaining fixed relative to the girder.

After the girder had been placed on the temporary supports and the slings removed, it was picked up again by the large hooks, which form a part of the permanent lifting apparatus on the swing span, and the latter revolved, until the girder came directly over the recesses provided for it in the side walls. The girder was then lowered into place and will be kept in these recesses until the backfilling and the permanent storage supports on the top level are completed. The unloading, turning and lowering into place of the eight girders was done with a small crew, without serious difficulty and at very reasonable cost.

Daily Paper Good Roads Edition

The cause of Good Roads in Virginia is strongly supported by the Richmond daily "Times-Dispatch" and "Evening Dispatch," which, under date of August 18, issued a 44-page special number, edited by 28 prominent specialists and devoted entirely "to the cause of improved highways and setting forth the advantages and economic values that will accrue to the state when its present streaks of mud have given place to permanently surfaced roads."

The purpose of this edition is to inform the people of Virginia of the necessity of good roads in the development of the state commercially, industrially and socially, and to further the educational campaign to be conducted by the Virginia Good Roads Association during the fall.

This Good Roads Edition is a compendium of the highway situation in Virginia as it exists today, and is meant to serve as a permanent work of reference in the solution of the transportation problem toward which Virginia must bend its energies.

Last fall it was voted to amend the State Constitution so as to permit the legislature to authorize a $50,000,000 bond issue for the building of roads.

What Electrical Operated Valves Are Doing for the City of Buffalo

Since 1917 at least $12,000 worth of fuel per year, a large labor bill, about one-third of the per capita water consumption has been saved and expensive construction postponed by a vigorous campaign for improved conditions and operation, an important feature of which is the quick long-distance operation by electric control of valves on 36 and 48-inch mains that enable the high and low pressure systems to be rapidly connected to supplement each other or be independent

August 12, 1921.

Editor, PUBLIC WORKS:

Dear Sir: As per your recent request I am enclosing herewith tracing showing lay-out of discharge mains in the Col. Francis G. Ward pumping station and proposed electrical control on the 36 and 48-inch valves on the low pressure system with a brief description showing the reason for this control and results expected to be obtained.

Sincerely yours,
GEORGE C. ANDREWS.

In 1917 the Bureau of Water, City of Buffalo, started a campaign in an intelligent manner to reduce water waste consumption. This campaign was started with three objects in view:

1st.—Reduction in operating cost due to decreased pumpage.

2nd—Eliminating necessity of laying new feeder mains on account of reduction in consumption.

3rd.—To reduce the total pumpage to a figure more in keeping with that of sister cities so that a filtration plant could be built at a much less expense than would be necessary if no control were exercised over the waste of water.

Since 1917 the per capita consumption has been reduced from 339 to 239 gallons and a continued reduction is being shown month by month. The average daily consumption for the past year was 120 million gallons with a daily peak load of 165 million and an hourly peak on the average day of approximately 150 million gallons.

Buffalo has two pumping stations—the Massachusetts avenue, equipped with six 30 million gallon triple expansion pumps, and the new Col. Francis G. Ward station at Porter avenue, equipped with five 30 million gallon pumps. The

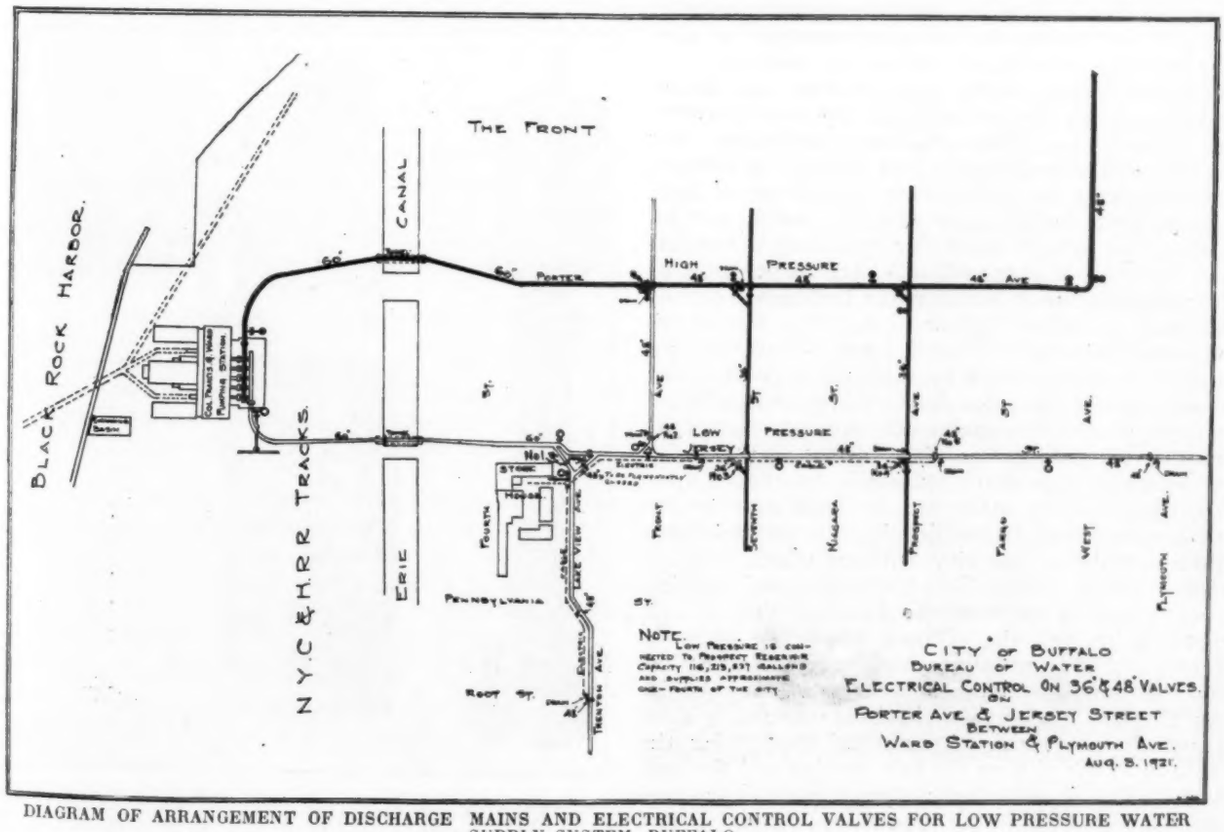
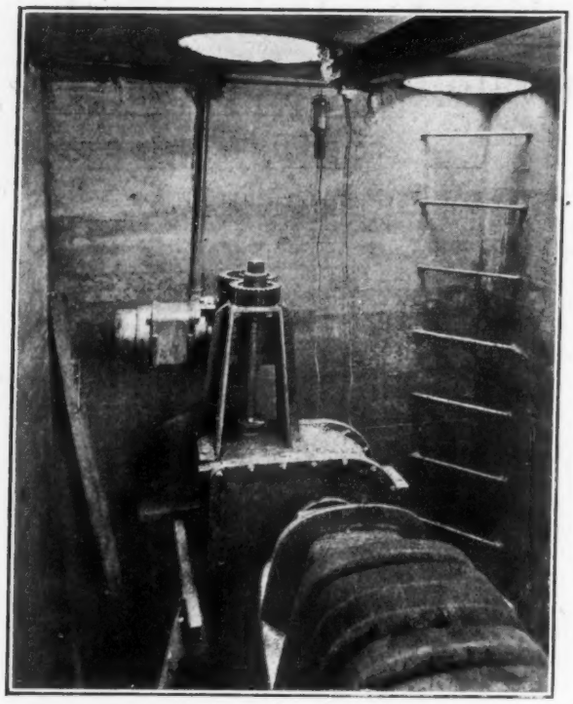


DIAGRAM OF ARRANGEMENT OF DISCHARGE MAINS AND ELECTRICAL CONTROL VALVES FOR LOW PRESSURE WATER SUPPLY SYSTEM, BUFFALO.



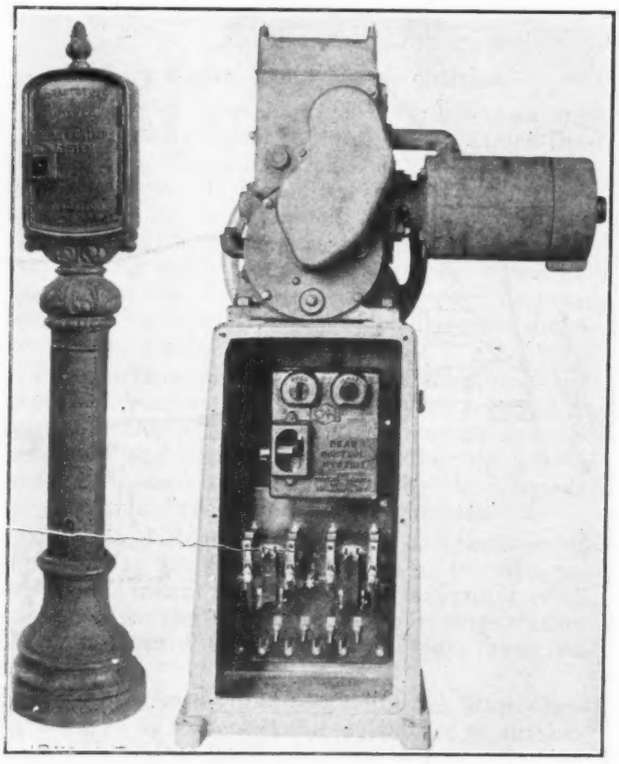
36-INCH RENSSELAER VALVE FITTED WITH DEAN CONTROL

more economical pumping can be done at the Ward station.

Water is supplied Buffalo at two pressures—the low, or reservoir service, and the high, or direct pumping service. The low service is connected with the Prospect reservoir with a capacity of 116 million gallons and supplies approximately one-fourth the daily consumption. The five pumps at the Ward station are connected by hydraulic valves with two 60-inch discharge mains—one on the low service, and the other on the high service. These discharge mains are connected with the 36-inch and 48-inch mains in Front avenue, Seventh street and Prospect avenue so that discharge from either main can be put on high or low service by operating the necessary valves. Under ordinary day's operation at the present time it is necessary to operate one of the pumps on the high service at the Massachusetts Avenue station in order not to overload the 60-inch discharge main on the high service at the Ward station. Besides that, we keep ample boiler reserve at the Massachusetts Avenue station to handle in emergency the entire high service pumpage, as the Ward station is dependent upon a single 60-inch main for its high service discharge and any failure in this line would leave three-fourths of the city without water.

By closing valves Nos. 1, 2 and 5 and opening valves Nos. 3 and 4 on the enclosed sketch, it is possible to put the 60-inch discharge main in Jersey street from low to high service and utilize it as an auxiliary high pressure discharge main. As the low pressure main is connected with a reservoir containing three days' supply for the section of the city on the low service and the area supplied is at sufficient distance from the pumping station so that the consumers cannot notice any difference in pressure whether they are fed from the pumps or reservoir, it is possible by opening and closing these valves to utilize the Jersey Street main for high pressure service during the hours of peak load and reducing the discharge materially through the 60-inch discharge main in Porter avenue. This will allow us to get the maximum output of 150 million gallons per day from the Ward station entirely on the high pressure system and will make it possible for us to meet all peak loan demands for 80 per cent of the year by the Ward station alone. During the night when the consumption is low the valves on Jersey street connecting with the reservoir will be opened, and those connecting with the high service closed, so that the reservoir can be filled. To operate these valves by hand would require not only the services of a large number of men but would consume considerable time and we have, therefore, contracted for the installation of electric control valves at these points—same to be operated from the Bureau of Water Storehouse at the corner of Jersey street and Lakeview avenue. This scheme allows us to have duplicate discharge mains on the high pressure system from the Ward station and will allow us to bank our fires at the Massachusetts Avenue station and reduce the coal consumption at that point from 10 to 15 tons per day for approximately 300 days per year, resulting in a reduction in operating cost in fuel alone of $12,000 per year at the minimum, not taking into consideration the additional saving in labor.

In the original plan of the Ward station it was proposed, and building and tunnels were so constructed, that two additional 60-inch mains could be laid in the station, but the proposed system



STREET PILLAR BOX STAND FOR CONTROL STATION. DEAN VALVE CONTROL STAND WITH CONTROL SWITCHES IN WATERTIGHT COMPARTMENT

of operating valves and utilizing both discharge mains on either high or low service makes it unnecessary to lay any additional 60-inch mains until such time as additional pumps are installed at the Ward station.

The contract for equipping these valves has been awarded to Payne Dean, Limited, of New York City, and work is being done under the direction of George C. Andrews, water commissioner. It is expected that contract will be completed by September 15.

The electrical control system is quite unique, inasmuch as there are two centralized points of control, one at the Lakeview Avenue storehouse, completely controlling five valves on Jersey street and the other control station at the Massachusetts Avenue gate keeper's house, controlling the ten valves in that section.

The problem of adapting a modern control system to old valves also had to be considered, as many of these valves bore no name and no identification mark as to number of turns required to operate.

The application of the Dean system is being made to each valve without in any way shutting down the supply, and during the time of construction the valves may be operated by hand in case of emergency.

The location in which the electrical operating device has to work is anything but desirable, since many of the vaults containing the valves are filled, or partially filled with water, and further, the Dean control units have to withstand rubbish and water that escape into the vault through the manhole covers. For this reason special attention is given to the design of the units to make them positively waterproof.

On Jersey street the valves will be operated from a pillar in the street, and adjacent to the valve, and also from the Lakeview storehouse, each valve then being operated from two points of control. The Massachusetts avenue valves are all operated from one point.

The cable conveying the current from the switchboard to the valves is all of the highly insulated lead covered steel taped type, buried about 24 inches below the ground level, and provided with waterproof joints wherever it is connected into the controlling apparatus.

The control units are to operate on current provided by the new turbine units being installed at the Francis G. Ward station. When this system is in operation it will enable each valve to be closed within ten minutes by merely touching a lever, providing at the same time indication by means of lights showing whether the valves are open or closed, and on one valve that is used for throttling purposes, an improved Dean position indicator is being installed, showing exact position of gate during its full length of travel.

The installation is such that the whole series of valves may be operated within a minute or so of each other, and electrical closing is accomplished by one man in a few minutes, whereas hand operation would require the best part of a day. Also the system will be utilized in case of leak or breaks.

Standard Test Specimens from Concrete Structures

Proposed tentative method for securing specimens of hardened concrete from the structure.*

The methods and precautions herein specified apply to securing test specimens from hardened concrete in the structure.

A specimen from hardened concrete to be tested for strength shall not be taken until the concrete has become hard enough so that the cutting of the specimen will not disturb the bond between the mortar content and the coarse aggregate of the specimen.

The specimen from the structure can best be secured by use of a core drill. For specimens taken perpendicular to a horizontal surface, a drill using chilled shot may be used; but when taken perpendicular to a vertical surface, a diamond drill should be used.

The core specimen taken shall be as nearly as possible a cylinder whose length is twice the diameter.

In securing a specimen perpendicular to a horizontal surface care shall be taken to secure, if possible, a specimen whose beds shall be parallel to the horizontal bed of the concrete as originally placed.

In securing a specimen perpendicular to a vertical surface, or to a surface with a batter, care shall be taken as to the point of securing the specimen. The lower portion of any one unit of depositing in mass concrete is more dense than is the upper portion of the unit, therefore a specimen shall be taken from near the middle of such unit of deposit.

A specimen to be taken from hardened concrete which has been removed from a structure shall be cut out by a drill or shall be cut into a symmetrical test-piece by tooling or by sawing. The method of sawing can seldom be used to advantage in the field. In selecting this test specimen care shall be used to see that the concrete selected has not been injured or shattered by the method of its removal from the structure.

The specimens secured shall have ends, or beds, as nearly as possible perpendicular to its axis, and, if the specimen has ends with uneven surfaces, these ends shall be made to parallel plane surfaces with a mortar richer than the mortar of the specimen or with a mixture of cement and calcined gypsum (plaster of Paris).

The state highway commission in New Mexico has launched a big road building program with six new Federal Aid projects, one to cost $46,707.02, a second to cost $65,505.67, a third $58,362.87, the fourth $41,624.73, a fifth $69,844.49, and the sixth $74,194.47.

*Regulations proposed by the Committee on Concrete and Concrete Aggregates of the American Society for Testing Materials, and submitted by them for criticisms which should be addresses, preferably before January 1, 1922, to Mr. A. T. Goldbeck, Secretary of Committee C-9 on Concrete and Concrete Aggregates, U. S. Bureau of Public Roads, Washington, D. C.

NEWS OF THE SOCIETIES

Sept. 6-10—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Colorado Springs, Colo. Secretary, C. R. George, Houston, Texas.

Sept. 7-9—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention. Secretary, L. C. Brinston, Portsmouth, Va.

Sept. 12-17—NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES. Seventh exposition. Eighth Coast Artillery Armory, New York City.

Sept. 12-17—NATIONAL ASSOCIATION OF SANITARY ENGINEERS. Evansville, Ind.

Sept. 12-26 — AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS. Wilkesbarre, Pa.

Sept. 13-16—NEW ENGLAND WATER WORKS ASSOCIATION. 39th annual convention. Bridgeport, Conn. Secretary, Frank J. Gifford, 715 Tremont Temple, Boston, Mass.

Sept. 14-15—ASSOCIATED BUILDING CONTRACTORS OF ILLINOIS. Semi-annual meeting. Danville, Ill.

Sept. 19-21—ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION OF AMERICA. Chicago, Ill. Secretary, P. J. McAndrews, C. & N. W. Ry., Sterling, Ill.

Sept. 19-23—INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONER. Chicago. Secretary, Ethelbert Stewart, U. S. Bureau of Labor Statistics, Washington, D. C.

September 19-24 — ASSOCIATION OF IRON AND STEEL ENGINEERS, La Salle Hotel, Chicago, Ill.

Sept. 22-24 — NATIONAL DRAINAGE CONGRESS. St. Paul, Minn.

Nov. 14-16—CITY MANAGERS ASSOCIATION. Annual meeting. Chicago. Secretary, H. G. Otis, city mgr., Clarksburg, W. Va.

Sept. 23—AMERICAN SOCIETY OF MECHANICAL ENGINEERS, METROPOLITAN SECTION. Enginering Societies Building, New York City.

Sept. 26-30—ILLUMINATING ENGINEERING SOCIETY. Rochester, N. Y, Illuminating Engineering Society, Chicago Section, Chicago with National.

Sept. 26-30— NATIONAL SAFETY COUNCIL. Boston, Mass.

Sept. 28 (10 days)—NEW YORK ELECTRICAL EXPOSITION. Seventy-first Regiment Armory, New York City.

October—IOWA SECTION OF THE AMERICAN WATER WORKS ASSOCIATION. Seventth annual meeting, Omaha, Neb. Secretary, Jack J. Hinman, Jr., State University, Iowa City, Ia.

Oct. 5-7—SOCIETY OF INDUSTRIAL ENGINEERS. National convention. Springfield, Mass.

Oct. 1-15—LYONS FAIR FOR PROMOTION OF INTERNATIONAL TRADE. Lyons, France.

Oct. 11-14—INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Annual Convention, Atlanta, Ga. Hotel Ansley. Secretary, James J. Mulcahey, Municipal Building, Denver, Colo.

Oct. 12-14—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention. Lawrence, Kans. Secretary, John G. Stutz, University of Kansas.

Oct. 20-21—OHIO STATE CONFERENCE ON CITY PLANNING. Annual conference. Columbus, Ohio. Secretary-treasurer — Charlotte Rumbold, Chamber of Commerce Building, Cleveland.

Oct. 24-28—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention. Southern Hotel, Baltimore, Md. Secretary, Charles Carroll Brown, Valparaiso, Ind.

Oct. 31-Nov. 5—NEW ENGLAND ASSOCIATION OF COMMERCIAL ENGINEERS. Power show in connection with INTERNATIONAL TEXTILE EXPOSITION. Mechanics' Building, Boston, Mass. Secretary, James F. Morgan, Devonshire st., Boston.

Nov. 14-18—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting. New York City.

Nov. 16-18 — NATIONAL MUNICIPAL LEAGUE. Chicago. Secretary, H. W. Dodd, 261 Broadway, New York City.

NEW ENGLAND WATER WORKS ASSOCIATION

The 40th annual convention of the New England Water Works Association, founded in 1882, will be held September 13, 14, 15, 16, 1921, in Bridgeport, Conn. Headquarters: The Stratfield Hotel (Colonnade); meeting room, South Sun Parlor; exhibits, ball room.

TUESDAY, SEPTEMBER 13

2 p. m., introduction of Mayor Wilson: by S. P. Senior, chairman of local committee.

Address of Welcome: Hon. Clifford B. Wilson, mayor of Bridgeport.

Response by the president of the association.

Business meeting, award of Dexter Brackett medal.

A description of the water works of the Bridgeport Hydraulic Co. by S. P. Senior, president.

EVENING

Informal reception, with dancing, in Sun Parlor, Stratfield Hotel—8 p. m. until midnight. Courtesy of Water Works Manufacturers' Association.

WEDNESDAY, SEPTEMBER 14

Executive committee meeting at 8:30 a. m.

Morning session, 9 a. m.

Standard specifications for water meters. Report of Committee, Wm. W. Brush, chairman.

Manganese bronze for valve stems, by Wm. R. Conard, inspecting engineer, Burlington, N. J.

Monel metal, and its suitability for water works uses, by H. S. Arnold, of International Nickel Co., New York.

At the close of the morning session automobiles will be taken to the works of the Crane Co. for a trip through its plant.

Following this, opportunity will be given for a visit to the Bridgeport Sewage Treatment Works, where a Reinsch-Wurl screen is installed. These works are not yet in operation.

AFTERNOON SESSION, 2 P. M.

Superintendents' session.

The economy of high initial cost and extreme care in service pipe installation, by Reeves J. Newsom, commissioner of water works, Lynn, Mass.

The disappearance of the coating from cast iron pipe while stored in the yard, by Samuel E. Killam, superintendent of Metropolitan Water Works, Boston, Mass.

The control of water waste by house to house inspection, by Gordon Z. Smith, chief inspector, Bridgeport Hydraulic Co.

(This company installs meters only on industrial and commercial services, and depends entirely on inspection to prevent excessive waste by domestic consumers. Would it be wiser, more ecomonical or more equitable to use meters instead?)

Entertainment for the ladies (afternoon and evening).

Ladies' card party and music at Brooklawn Country Club, with special entertainment in the evening. Transportation will be provided. Prizes will be awarded to the winners at the card party. (Courtesy of Water Works Manufacturers' Association and Bridgeport Hydraulic Co.)

(Papers obtained by Water Works Manufacturers' Association.)

Reinforced concrete pipe as applied to water supply lines, by W. G. Chace, of the Lock Joint Pipe Co.

The selection of pipe for water works, by J. W. Ledoux, consulting engineer, Philadelphia, Pa.

The chlorination of New England Water Supplies, by Wm. J. Orchard, of Wallace & Tiernan Co.

THURSDAY, SEPTEMBER 15

Morning session, 9 a. m.

The electrolytic Generation of Chloine at its point of application, by C. W. Marsh, consulting engineer, New York City.

The typhoid fever epidemic at Salem, Ohio, by W. H. Dittoe, chief engineer, Ohio State Board of Health.

The significance of "Hydrogen-Ion Concentration," in water purification, by Harrison P. Eddy, consulting engineer, Boston, Mass.

AFTERNOON SESSION, 2 P. M.

Can high-value water shed lands be put to profitable use? by S. P. Senior, president, Bridgeport Hydraulic Co.

The economics of the several lines of defense in the protection of water supplies, by Allen Hazen, consulting engineer, New York City.

Entertainment for the ladies. Guides will be provided and automobiles supplied for visits to points of local interest, and for rides into the country or along the Sound. Small parties will be made up for such trips.

EVENING SESSION, 8 P. M.

Water works accounting, discussion of committee report presented at 1920 convention.

An appraisal of the quality of water supplies in Massachusetts, by George C. Whipple, professor of sanitary engineering, Harvard University.

FRIDAY, SEPTEMBER 16

Morning session, 9 a. m.

The pollution of streams effecting industrial uses, by J. Frederick Jackson, director, Division of Sanitary Engineering.

The repairs to the standpipe at Bath, Maine, by Clarence E. Carter, assistant engineer, Metcalf & Eddy, Boston, Mass., and Walter F. Abbott, superintendent Bath Water District.

(The upper third of this standpipe was collapsed by wind pressure, and it remained in this condition for more than a year, after which it was repaired.)

Picnic and shore dinner, at "The Farms," (formerly the Black Rock Country Club). Facilities are provided for baseball, tennis, bowling, billiards, dancing, etc. (Courtesy of the Water Works Manufacturers' Association.)

Visits to works of Bridgeport Hydraulic Co. Small parties will be made up for excursions over the works of the company between sessions or at the convenience of the members.

Others visits or excursions—automobiles will be available at all times for the accommodation of members and their guests, to visit points of interest or for pleasure drives.

Golf—The links of the Brooklawn Country Club will be open to our members and guests, and arrangements will be made through the golf committee for tournaments or for individual play. All members who play at all are urged to bring their clubs. (Courtesy of Bridgeport Hydraulic Co.)

It is hoped that twenty or more players will signify their intention of participating, making it possible to run a two-day tournament, with fligts of eight players starting the qualifying round Wednesday morning and continuing that afternoos and all Thursday. If there are too few for this tourament, ball sweepstakes will be played. Prizes have been provided by the Water Works Manufacturers' Association. Notification of intention to play should be sent at once to the chairman of the Golf Committee, Egbert D. Case, Pitometer Co., 50 Church street, New York City.

INTERNATIONAL ASSOCIATION OF STREET CLEANING OFFICIALS

The second annual conference of the International Association of Street Cleaning Officials was held in Chicago August 10 and 11. The main topics discussed at this meeting were methods of street cleaning and the disposal of refuse. The program included no papers, but was arranged to cover six subjects for discussion, which took the form mainly of recitations of experiences of the official speaking.

Three amendments were made to the constitution. These were that the name of the association be changed to the International Association of Street Sanitation Officials; that three vice-presidents instead of one be included in the list of members; and that associate membership be extended to engineers and publishers.

The following officers were elected for the ensuing year: President, W. J. Galligan; vice-presidents, Abram Swan, E. F. Murphy and J. S. Miller: secretary, A. M. Anderson; and treasurer, R. W. Waddell.

KANSAS CITY ENGINEERS CLUB

By a letter ballot recently taken the Kansas City Engineers' Club has decided to discontinue its affiliations with the American Association of Engineers. As this leaves the American Association of Engineers unrepresented in that city, steps have already been taken for the establishment of a chapter of the A. A. E. in Kansas City.

WESTERN SOCIETY OF ENGINEERS

The following officers have been elected by the Western Society of Engineers for the ensuing year: President, Charles H. MacDowell; vice-presidents, Julius L. Hecht, F. F. Fowle and B. S. Shapiro; and treasurer, Homer E. Niess.

PERSONALS

Lehman, George M., nas been appointed chief of the newly formed division of waterways of the bureau of statistics and information, Department of Internal Affairs, Pennsylvania.

Gordon, J. Blake, senior assistant engineer of the sewer department, District of Columbia, has been appointed sanitary engineer to succeed Asa E. Phillips, who resigned.

McClendon, W. W., has been appointed consulting engineer for Navarro county, Texas.

Mahlie, W. S., of Columbus, Ohio, has been appointed bacteriologist in charge of the filtration plant for the Fort Worth, Texas, water works.

Clark, F. M., formerly assistant chief engineer of the Nova Scotia Highways Board, has been appointed construction engineer for the Maine Highway Commission.

Eichelberger, Fred O., director of public service of Dayton, Ohio, for more than a year past, has been appointed city manager in place of W. C. Barber, resigned.

Skeggs, Major John H., has been appointed acting division engineer of Division four by the California state highway commission, to take the place of W. Lewis Clark.

Maier, Edward H., has been named city engineer of Bridgeton, N. J.

Painter, P. C., formerly city engineer of Washington, N. C., has been elected city manager of Greensboro, N. C.

May, Charles A., has been appointed state engineer of New Mexico.

Phillips, Asa E., has resigned as sanitary engineer of the District of Columbia, after more than thirty years' continuous service with that district.

Smith, Herman H., formerly chief engineer of the bureau of highways, borough of Brooklyn, N. Y., has been appointed chief engineer of the New York Board of Estimate and Apportionment.

Miller, Frederick R., has been appointed member of the Ontario Hydro-electric Power Commission.

Ferver, A. L., has been appointed director of public service and ex-officio city engineer of Long Beach, Cal.

Cochrane, John L., for many years statistician of the United States Bureau of Mines, died in Cleveland recently.

Rondeau, C. W. H., of Westmont, Que., has been elected president of the Union of Canadian Municipalities.

Waddell, Charles E., of Asheville, N. C., has been appointed chairman of the North Carolina state board of registration for engineers and surveyors which was created by the last legislature.

Coleman, H. W., former superintendent of the water and sewer departments of Greenville, Miss., has been appointed city engineer and superintendent of streets, Albany, Ga.

Cooper, C. M., has been appointed county engineer of Crawford county, Kan.

Fletcher, A. B., who has been appointed director of the department of public works of the state of California under the reorganization plan has announced the following appointments in his department: Chief of division of land settlement, Dr. Elwood Meade; chief of division of engineering and irrigation, Wilbur F. McClure; chief of division of architecture, George B. McDougall; chief of division of water rights, C. H. Lee.

Smith, Prof. Leonard S., has been engaged to act as advisor to the Appelton, Wis., city planning commission.

Tour, Dr. Reuben S., has been appointed professor of chemical engineering and commerce, University of Cincinnati.

Cravens, C. L., has accepted a position with the Florida State Road Department.

Pierce, Rolland, is now in charge of the distribution of water for irrigation from Portneuf river at Boise, Idaho.

Vincent, A. W., has been appointed city engineer of Albany, Ga.

Coleman, Col. H. W., has been appointed city engineer of Albany, Ga.

Hickok, Maj. Clifton E., has been made city manager of Alameda, Cal.

The new bipartisan water board of Kansas City, Mo., is composed of Alexander Maitland, construction engineer and president of the Kansas City Bridge Co., chairman; George H. Edwards, president of the Edwards, Ludwig, Fuller Jewelry Co. and former mayor of Kansas City; Hughes Bryant, real estate broker, building advisor and fiscal agent; and Louis P. Rothschild, president of Rothschild & Sons, clothiers.

INDUSTRIAL NOTES

Finch, Jeremiah C., has been appointed secretary of the New York State Highway Commission.

Grant, J. A., is designing the hydraulic work on the reconstruction of works in Pueblo, Colo.

Morgan, Arthur E., has resigned as chief engineer of the Miami Conservancy District and will divide his time between engineering practice with the Dayton Morgan Engineering Co., Dayton, Ohio, and his work as president of the Antioch College at Yellow Springs, Ohio.

Paul, Charles H., will succeed Arthur E. Morgan as chief engineer of the Miami Conservancy District.

Van Dusen, E. A., has accepted a position with the Power Construction Co., Worcester, Mass.

Bean, Benjamin, has been appointed field engineer with the State of Missouri on Project 99, Clay county, on federal aid highway construction.

Martin, Cedric A., has been made construction engineer for the city of Payallup, Wash., on sewer and paving work.

Smith, Jr., Martin W., is now assistant city engineer of Clarksburg, Va.

Leland, O. Miner, is now the dean of the engineering department of the University of Minnesota.

Monsarrat, Charles N., has been appointed consulting engineer of bridges, Canadian National Rys. He will continue his private practise.

Greene, Prof. Arthur M., will take up his new duties as dean of the engineering school and professor of mechanical engineering at the Rensselaer Polytechnic Institute in September, 1922.

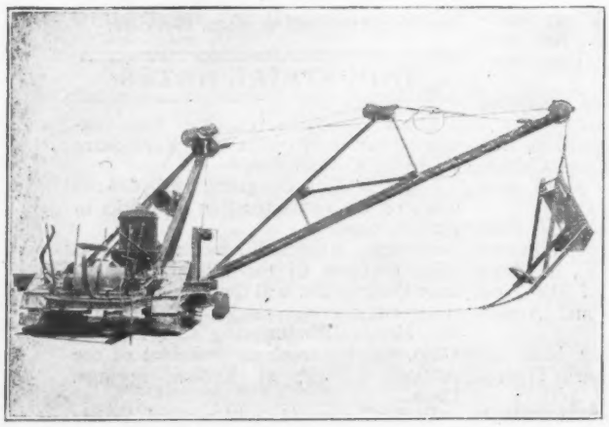
New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

NEW 18 H. P. BACKFILLER

P & H 203 is the new power backfiller designed by the Pawling & Harnischfeger Co., of Milwaukee, to speed up the work of backfilling trenches and ditches. This machine is mounted on full corduroy tread and is operated entirely by one man, who guides the progress of the machine as well as the scraper bucket and boom. The boom on the 203 is 30-foot maximum, 20-foot minimum, and the engine is a heavy duty 18 h. p., four-cylinder gasoline unit. pipe trench.

With the boom extended to its maximum length of 30 feet, four loads may be filled in one minute. With shorter boom length more loads are handled. With this P & H backfiller the operator can work steadily without fatigue and do the same work as a crew of 40 to 50 laborers backfilling with shovels. The construction is like P & H excavator-cranes; the body being made of heavy I-beams; gears cut from solid block; steel plate corduroy treads, gear-driven; and centralized control.



BACKFILLER MOUNTED ON CORDUROY TREAD

DITCHING WITH A MARTIN PERFECT ROAD MAKER

The Martin perfect road maker machine, manufactured by the Owensboro Ditcher & Grader Co., is a V-shaped scraper plow with a 5 to 7-foot blade and a long steel-plated wooden extension arm to throw the loose earth farther away. It is provided with a swivel joint, enabling the machine to be quickly reversed and can be hauled by horses or by a tractor.

It can be operated by one man and is satisfactory for digging ditches in rough and hilly ground. It is also serviceable for cleaning out ditches. In Logan county, Ky., 28 of these machines are in use on the roads, in McLean county 25, in Marshall county 16, in McCracken county 15 and in Marion, Ala., 18, besides numerous other counties in the southern states that use from 2 to a dozen each of the machines.

CUTTING A DITCH WITH THE MARTIN PERFECT ROAD MAKER

INDUSTRIAL NOTES

The International Diamond Drill Contracting Co. has been awarded the contract for making diamond drill explorations at the site of the Columbia river dam near the Grand Coulee, Wash., in order to determine if granite bedrock lies within 100 feet below the glacial deposits.

The contract was awarded on the basis of the payment of costs and a fee of $19 per day of two eight-hour shifts with the option of continuing the work after one month on a basis of cost plus $1 to $1.50 per foot drilled.

The Williamsport Wire Rope Co. has doubled the capacity of its Chicago warehouses, facilities being afforded for immediate shipments of any size and construction of wire rope.

TRAFFIC TRUCK

The Traffic truck manufactured by the Traffic Motor Truck Corporation has a capacity of 4,000 pounds or 1.7 yards of sand, gravel or crushed stone, and is provided with flare boards 10 inches high. The all-steel dump body has an especially designed rear end gate hinged at top and locked at bottom, that is operated by a lever at the driver's seat and may be revolved 270 degrees to lie flat on top of the body, thus permitting lumber and other long materials to project beneath it.

The truck is furnished with a hand hoist used to lift the capacity load with a force of only 25 pounds pressure on the handle. The side rails form a positive stop for the dump body in its highest position and thus prevent it from being carried over by the rush of material out of the rear end gate.

STANDARD STEEL WORKS MOVES

The Standard Steel Works, 1722 Tracy avenue, Kansas City, Mo., have just completed a new plant at 16th and Holmes streets, North Kansas City, Mo., and are moving into it this month.

The new plant is a modern daylight factory building of steel and brick construction. The factory, all on one floor, with office occupying second floor. The building has 30,000 square feet of floor space.

This modern plant is devoted to the manufacture of standard steel dump bodies, hand hoists, truck tanks, road workers' equipment, and a complete line of mill and elevator equipment. Their business has been increasing rapidly during the last year and they will have a much larger capacity in their new location.

The Merchants' Steel & Supply Co., Chicago, has become sole distributor for the products of the Tubal Chemical Co., producers of specialties for the iron industries.

J. A. Henry has been appointed Western district manager of the Warren Iron & Steel Co., Warren, Ohio, with offices at 1810 Continental and Commercial Bank building, Chicago.

F. Stugard, formerly superintendent of the Kosmos Portland Cement Co., Kosmosdale, Ky., has resigned, and E. J. Davis has been engaged as superintendent of the plant of this company.

B. J. Latimer has been appointed superintendent of the Nebraska Cement Co., Superior, N. Y.